



IN THE CLAIMS

please amend the claims as follows:

Claim 1 (Currently Amended): A ranging and positioning system to measure a distance between two radio sets which send and receive packets to and from each other and to determine a relative position of such two radio sets, said system comprising:

a sending radio set configured to transmit packets;

a receiving radio set configured to receive the packets and then send the packets back to the sending radio set after a certain length of time corresponding to an integral multiple of a prescribed unit time,

wherein the sending radio set calculates the time required for the packets to be transmitted to, and, return [[and]] from the receiving radio set by subtracting the integral multiple of a prescribed unit time from the time taken from transmission of packets to reception of packets, thereby determining the distance between the sending and receiving radio sets according to the time required for the packets to be transmitted and return.

Claim 2 (Original): The ranging and positioning system as defined in Claim 1, wherein the prescribed unit time is determined from the quotient of the distance over which communication by the radio sets is possible divided by the velocity at which radio signals propagate.

Claim 3 (Previously Presented): The ranging and positioning system as defined in Claim 1, wherein the sending radio set measures the time taken from transmission of the packets to reception of the packets from the receiving radio set each time the sending radio set communicates with the receiving radio set, and the sending radio set renews the result of distance measurement each time.

Claim 4 (Original): The ranging and positioning system as defined in Claim 1, wherein the relative position is used after the result of measurement has been verified by the intensity of received signals and/or the result of packet demodulation.

Claim 5 (Previously Presented): The ranging and positioning system as defined in Claim 1, wherein each radio set has memory in which to store a list of neighboring radio sets and to store ranging data of itself and each of the neighboring radio sets, and renews the content of memory each time it performs ranging.

Claim 6 (Previously Presented): The ranging and positioning system as defined in Claim 5, wherein each radio set acquires the ranging information possessed by neighboring radio sets and determines a position relative to the neighboring radio sets from the thus acquired ranging information and its own ranging information.

Claim 7 (Original): The ranging and positioning system as defined in Claim 5, wherein one stationary radio set possesses information indicating that it is stationary and other radio sets detect this information by communication with the stationary radio set, thereby determining their respective positions relative to the stationary radio set.

Claim 8 (Original): The ranging and positioning system as defined in Claim 1, wherein communication between two radio sets is accomplished twice in such a way that the time required for the receiving radio set to return packets is changed, so that the sending radio set cancels, by using the results of two measurements, errors resulting from the accuracy of measurements of the prescribed time by the receiving radio set.

Claim 9 (Previously Presented): The ranging and positioning system as defined in Claim 1, wherein two or more radio sets are arranged such that a specific positional relation

is established among their antennas and each radio set fills the gap between the nominal value and the actual value of the time taken from a corresponding detection of packets to the transmission of packets by using the result of measurement compared with the known relative distance.

Claim 10 (Previously Presented): The ranging and positioning system as defined in Claim 1, wherein two or more radio sets are arranged such that a specific positional relation is established among their antennas and each radio set corrects errors of an oscillator from the result of measurement compared with the known relative distance.

Claim 11 (Previously Presented): A ranging and positioning method for measuring a distance between two radio sets which send and receive packets to and from each other and to determine a relative position of such two radio sets, said method comprising:

- transmitting packets from a sending radio set;
- receiving the packets at a receiving radio set;
- returning the packets after a lapse of time corresponding to an integral multiple of a prescribed unit time from the receiving radio set;
- determining the time taken from transmission of packets from the sending radio set, to reception of returned packets to the sending radio set;
- calculating the time required for the packets to be transmitted and returned by subtracting the integral multiple of the prescribed unit time from the counted time; and
- determining the distance between the sending radio set and the receiving radio set from the time required for packets to be transmitted and returned.

Claim 12 (Original): The ranging and positioning method as defined in Claim 11, wherein the prescribed unit time is determined from the quotient of the distance over which communication by the radio sets is possible divided by the velocity at which wireless signals

propagate.

Claim 13 (Original): The ranging and positioning method as defined in Claim 11, wherein distance measurement is executed only when the result of measurement by the radio set is verified by the intensity of received signals and/or the result of packet demodulation.

Claim 14 (Previously Presented): The ranging and positioning method as defined in Claim 11, further comprising:

storing a list at each radio set of neighboring radio sets and the ranging data of itself.

Claim 15 (Previously Presented): The ranging and positioning method as defined in Claim 14, further comprises:

acquiring at each radio set the ranging information possessed by its neighboring radio sets; and

determining a position of each radio set relative to its neighboring radio sets from the thus acquired ranging information and its own ranging information.

Claim 16 (Previously Presented): The ranging and positioning method as defined in Claim 14, further comprising:

detecting the information of other stationary radio sets at each radio set by communication with them, thereby determining its position relative to the stationary radio set.

Claim 17 (Previously Presented): The ranging and positioning method as defined in Claim 11, further comprising:

carrying out communication twice by the receiving radio set in such a way that the time required for the receiving radio set to return packets is changed, so that the sending radio set cancels, by using the results of two measurements, errors resulting from the accuracy of

measurements of the prescribed time by the receiving radio set.

Claim 18 (Previously Presented): The ranging and positioning method as defined in Claim 11, further comprising:

arranging two or more radio sets such that a specific positional relation is established among their antennas and each radio set fills the gap between the nominal value and the actual value of the time taken from a corresponding detection of packets to the transmission of packets by using the result of measurement compared with the known relative distance.

Claim 19 (Previously Presented): The ranging and positioning method as defined in Claim 11, further comprising:

arranging two or more radio sets such that a specific positional relation is established among their antennas and each radio set corrects errors of a oscillator by using the result of measurement compared with the known relative distance.

Claim 20 (Previously Presented): A radio communication apparatus for ranging and positioning by packet transmission and reception, comprising:

means for transmitting packets;

means for detecting returned packets after a lapse of time that follows packet transmission which is equivalent to an integral multiple of a prescribed unit time;

means for measuring time that has elapsed from transmission of packet to detection of returned packets by subtracting the integral multiple from the elapsed time; and

means for calculating the distance to the recipient of packets from the thus measured time.

Claim 21 (Original): The radio communication apparatus as defined in Claim 20, wherein the prescribed unit time is derived from the quotient of the distance over which

communication with the radio communication apparatus is possible divided by the velocity at which radio signals propagate.

Claim 22 (Previously Presented): The radio communication apparatus as defined in Claim 20, wherein the packet detecting means detects the position for packet detection through correlation between the receiving data and the spreading code.

Claim 23 (Previously Presented): The radio communication apparatus as defined in Claim 20, wherein the means for calculating the distance to the recipient of packets determines the time taken by the packet receiving radio set from its packet detection to its packet transmission on the basis of the integral multiple of the prescribed unit time, and converts for ranging the remainder after subtraction of the measured time from the thus determined time and the processing time of its own, into the propagation distance to the packet receiving radio set.

Claim 24 (Previously Presented): The radio communication apparatus as defined in Claim 20, wherein the means for calculating the distance judges the validity of the result of measurement by the radio set on the basis of the intensity of received signals and/or the result of packet demodulation, and, if the result of judgment is affirmative, executes the measurement of distance.

Claim 25 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:

means for controlling the sending power of the radio set on the basis of the result of ranging by the means for calculating the distance.

Claim 26 (Previously Presented): The radio communication apparatus as defined in

Claim 20, further comprising:

means for controlling or limiting a specific function on the basis of the result of ranging by the means for calculating the distance.

Claim 27 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:

means for performing communication for a specific function relating to security only when the relative distance is less than a prescribed value on the basis of the result of measurement by the means for calculating the distance.

Claim 28 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:

means for reducing the sending power and/or increasing the transmission rate according to the result of ranging by the means for calculating the distance, thereby intentionally making reception difficult for radio sets excluding a specific recipient.

Claim 29 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:

means for storing a list of its neighboring radio sets and data of distance between itself and individual radio sets.

Claim 30 (Previously Presented): The radio communication apparatus as defined in Claim 29, further comprising:

means for acquiring ranging information possessed by other radio sets; and  
means for deriving the position relative to its neighboring radio sets from the thus acquired ranging information and the ranging information of its own.

Claim 31 (Previously Presented): The radio communication apparatus as defined in Claim 29, wherein each radio set has means for detecting through communication the information about stationary radio sets and then deriving its position relative to the stationary radio sets.

Claim 32 (Currently Amended): The radio communication apparatus as defined in Claim 31, wherein each radio set has means for combining the position information of three or more stationary radio sets with other map position information (~~such as sketch and map~~) and deriving, thereby mapping, its position or the position of other radio sets on the basis of the position information of other two or more radio sets.

Claim 33 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:

means for canceling errors resulting from the accuracy of measurements of the prescribed time by the receiving radio set, on the basis of the results of two measurements, carried out in such a way that the time required for the receiving radio set to return packets is changed.

Claim 34 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:

means for filling the gap between the nominal value and the actual value of the time taken from the detection of packets to the transmission of packets by using the result of measurement compared with the known relative distance between the sending and receiving radio sets whose antennas are arranged in a specific relative position.

Claim 35 (Previously Presented): The radio communication apparatus as defined in Claim 20, further comprising:



means for correcting errors of the oscillator by using the result of measurement compared with the known relative distance between the sending and receiving radio sets whose antennas are arranged in a specific relative position.